

2020/TDC/ODD/SEM/
BCAC-501/183

(2)

TDC Odd Semester Exam., 2020
held in July, 2021

COMPUTER APPLICATION
(Honours)

(5th Semester)

Course No. : BCAC-501

Full Marks : 35
Pass Marks : 12

Time : 2 hours

*The figures in the margin indicate full marks
for the questions*

Answer **five** questions, selecting **one** from each Unit

UNIT—I

1. (a) Justify whether $2^{n-1} = O(2^n)$ and $2^{2n} = O(2^n)$. 3
- (b) Show that for any real constants a and b , where $b > 0$
 $(n + a)^b = O(n^b)$ 4

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(Turn Over)

2. (a) Show that an n element heap has height $\lg n$. 3
- (b) Show that building a max or min heap is of the order $O(n)$. 4

UNIT—II

3. Show how selection sort sorts the following sequence keys : 7
64, 25, 12, 22, 11
4. Write an algorithm for merge sort. Show the computing time for merge sort is $O(n \log n)$. 7

UNIT—III

5. (a) Explain what is dynamic programming. How does it differ from greedy methods? 5
- (b) What is the optimal substructure property of dynamic programming? 2
6. Explain travelling sales person problem with proper example. 7

UNIT—IV

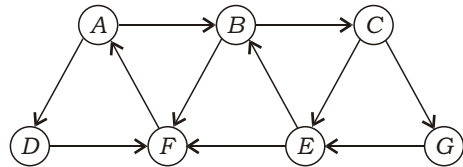
7. (a) Explain Breadth-First Search (BFS) algorithm. 3

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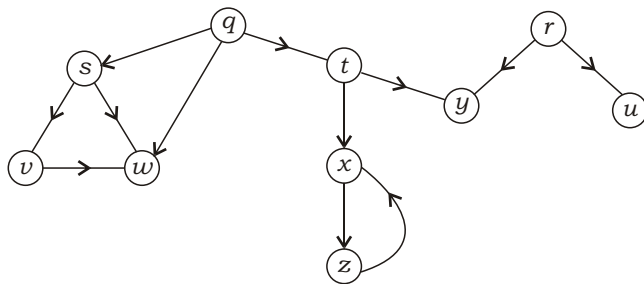
(3)

- (b) Calculate the minimum path P from node A to node E of the graph G given below :



Given that each edge has a length of 1. 4

8. Show how Depth-First Search works on the graph given below :



Assume that the DFS procedure considers the vertices in alphabetical order and also assume that each adjacency list is ordered alphabetically. Show the discovery and finishing times of each vertex and show the classification of each edge. 7

(4)

UNIT—V

9. What is backtracking algorithm? Explain how the n -queens problem is solved using backtracking. 7
10. Write short notes on the following : 7
- (a) NP-hard problems
 - (b) NP-complete problems
